

MERCURY OVERVIEW

- 1. Global anthropogenic mercury in the environment summary
- 2. UNEP Global Mercury Assessment
- 3. NSTC Interagency Working Group on Methylmercury

GLOBAL SOURCES OF MERCURY

1. "Industrial" mercury

- Mercury that is mined, processed, and used intentionally in industrial or consumer products and processes
- Exposure is occupational, local, often elemental

2. "Incidental" mercury

- Mercury that occurs incidentally in materials that are burned or processed, emitted in gaseous or soluble forms
- Exposure is regional or global, as elemental, salt, or methylmercury

INDUSTRIAL MERCURY: MERCURY IN CONSUMER PRODUCTS AND PROCESSES

Batteries Alkaline Mercuric oxide Electric Lighting Fluorescent Lamps High Intensity Lamps Paint Residues Hg-Thermometers Thermostats **Pigments** Dental Uses Special Paper Coating Mercury Light Switches Film Pack Batteries

372 metric tons Hg consumed in U.S.

U.S. INDUSTRIAL MERCURY CONSUMPTION

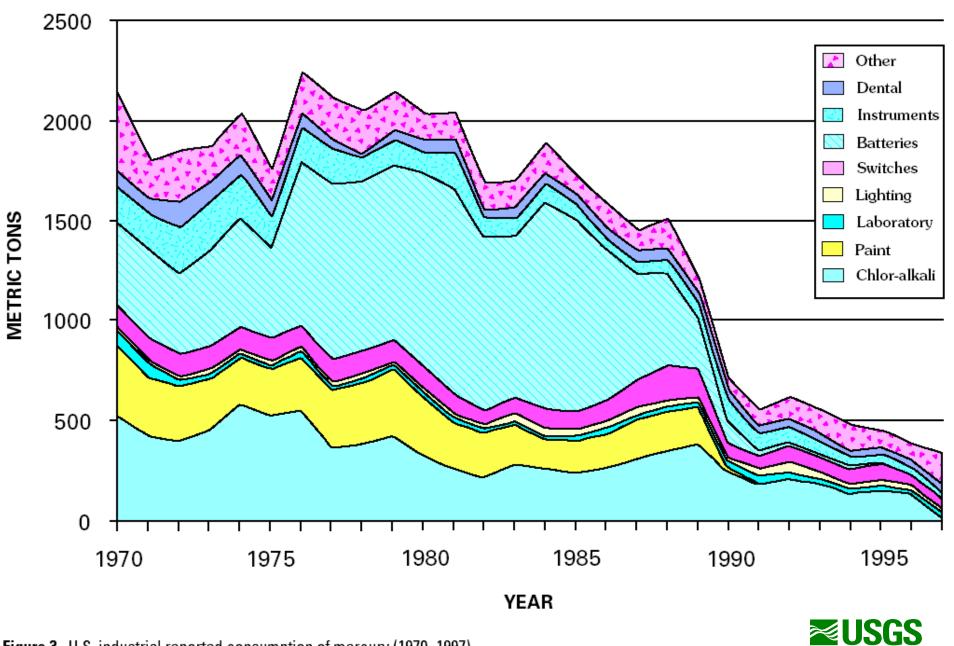


Figure 3. U.S. industrial reported consumption of mercury (1970–1997).

"INCIDENTAL" MERCURY:

- Mercury emitted from combustion or roasting of Hg-containing materials
- · Hg enters the environment as elemental Hg, HgCl₂, or other salt
- Hg is widely dispersed by atmosphere and oceans
- Hg is deposited, methylated, and enters food chain - may become human health problem

AQUATIC MERCURY CYCLE **DEPOSITION DEPOSITION VOLATILIZATION** VOLATILIZATION AND DEPOSITION AND DEPOSITION DEMETHYLATION REDUCTION CH3HG DEPOSITION Hg(0) Hg(II) DEPOSITION AND RUNOFF AND RUNOFF OUTFLOW CH₃Hg Hg(II) OUTFLOW OUTFLOW METHYLATION BIOMAGNIFICATION **SEDIMENTATION SEDIMENTATION** DIFFUSION/ **SEDIMENT** RESUSPENSION CH₃Hg Hg(II)



MAIN SOURCES OF "INCIDENTAL" MERCURY EMISSIONS

- · Coal combustion*
- · Oil* and natural gas combustion
- Municipal solid waste combustion**
- Medical waste combustion**
- Hazardous waste combustion**
- Cement kiln operation
- · Sewage sludge incineration
- · Smelters
- · Landfills

MERCURY ENTERING THE ENVIRONMENT IN THE U.S.

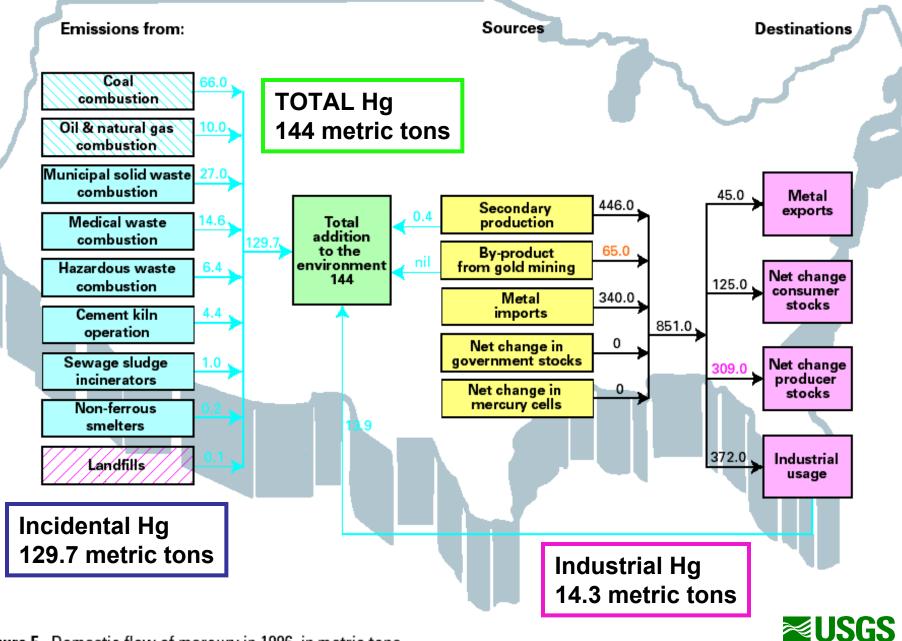
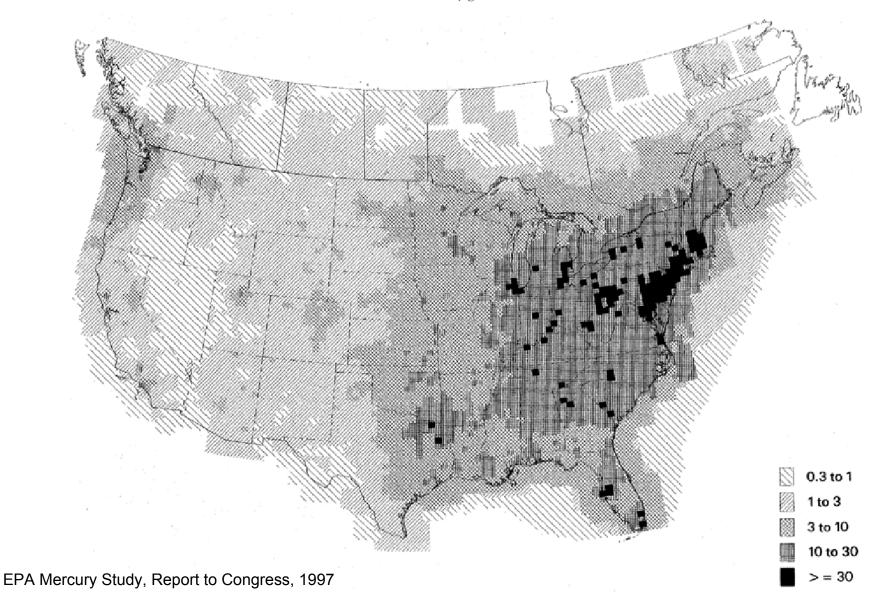


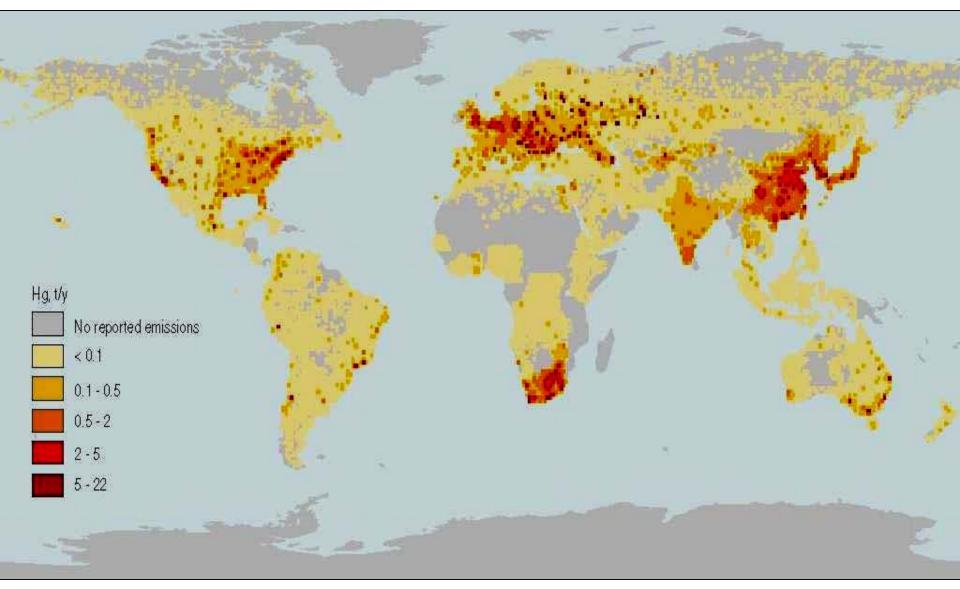
Figure 5. Domestic flow of mercury in 1996, in metric tons.

DEPOSITION OF TOTAL MERCURY IN U.S.

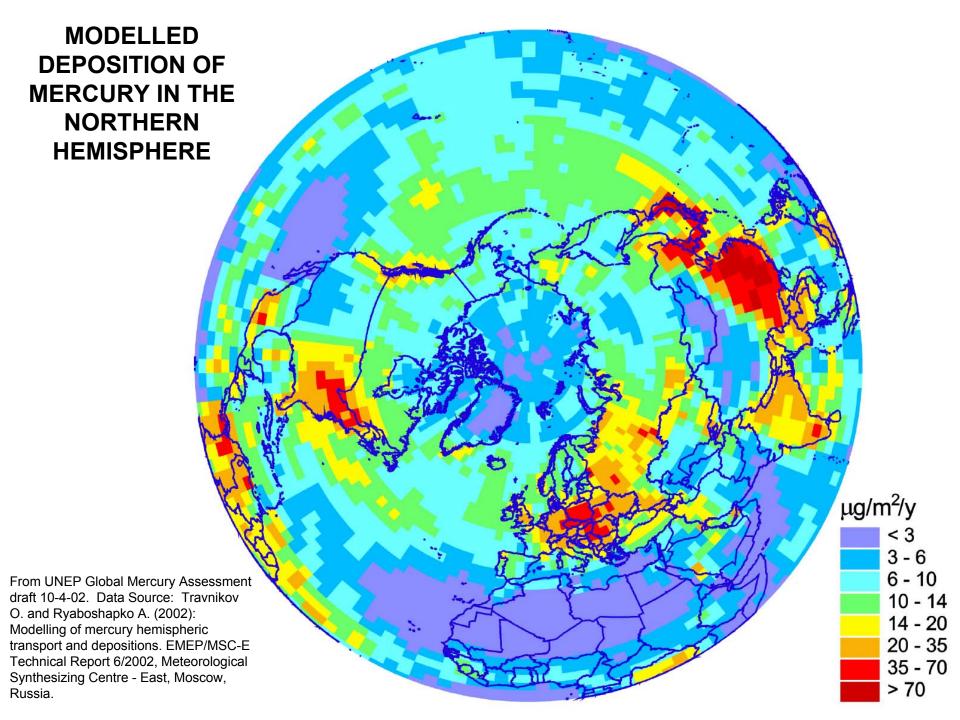
Figure 3-3 Total Simulated Wet + Dry Deposition of Mercury in All Forms Units: $\mu g/m^2$



GLOBAL DISTRIBUTION OF MERCURY EMISSIONS TO AIR



From UNEP Global Mercury Assessment draft 10/04/02. Source of data: J. Pacyna pers. comm., Canadian Global Emissions Interpretation Centre (CGEIC), as presented by AMAP (1998). Original figure presented courtesy of AMAP, Norway.



UNITED NATIONS ENVIRONMENTAL PROGRAM: GLOBAL MERCURY ASSESSMENT

- U.S. participation coordinated by State Department with input from EPA, NIH, DOE, and other Federal agencies
- Purpose: To provide sound scientific background for any international measures taken to address adverse impacts of mercury on a regional or global scale
- Key issues: global cycling of mercury, impact of mercury on global fishing, mercury hazards in poor regions, mercury as a commodity subject to international use and commerce, identification of sensitive populations, identification of critical regional problems
- Outcome: UNEP Governing Council to make recommendations for multinational agreements on mercury



- Formation: May 20, 2002. Presidential response to letter from Sen. Jeff Sessions expressing concern about methyl mercury in Gulf of Mexico
- Purpose: Provide an interagency forum to understand the impact of methyl mercury on human health, it's causes, and to recommend strategic Federal R&D pathways to solutions.
- *Process*: Monthly meetings of agency/department representatives, exchange of information about work and data, development of R&D budget and work strategies within agencies to address the gaps and find solutions.



National Science and Technology Council (NSTC)

Chair: President Bush

Membership: Cabinet Secretaries

Administration: Office of Science and Technology Policy (OSTP)

Dr. John H. Marburger III, President's Science Advisor

Purpose: Address science and technology issues affecting

policy decisions

Committee on Environment and Natural Resources

Co-chairs: Conrad Lautenbacher (NOAA), Paul

Gilman (EPA), Kathie Olsen (OSTP)

Membership: Heads of science agencies

Subcommittee on Toxics

Interagency Working Group on Methylmercury

Co-chairs: Paul Anastas (OSTP), Elizabeth Stolpe (CEQ)

Members: Agency managers and scientists dealing with

mercury



CHARTER: Provide an interagency forum for coordination, strategic planning, and research and development to better understand the national impact of methyl mercury on human health and to identify potential solutions.

- Bring all Federal agencies to the table
- Review and evaluate agency research and data
- Identify data gaps and research needs
- Develop strategy for addressing needs through agency planning process and budget formulation
- Coordinate with other CENR subcommittees, state and local efforts



- Participating Federal agencies:
 - EPA
 - MMS
 - NMFS
 - NOAA
 - USGS
 - HHS
 - NIH
 - FDA
 - · CDC
 - State Dept.

Work of agencies will involve local, state, regional, and industry groups.



Action Plan: Phase 1: Examine the Gulf of Mexico as a priority study area - Identify gaps in data and recommend strategies for agencies to fill gaps.

- Identify fish species contaminated with levels of methylmercury that pose human health risk
- Identify mercury pathways for species that pose a human health risk
- Identify the ultimate sources of mercury in GOM
- Identify prevention or control measures
- Estimate time period for methylmercury decline after prevention/control measures
- Expand assessment methodology to national scale



National Research Needs on Mercury:

- I. Atmospheric mercury sources
- II. Atmospheric transport and deposition
- III.Mercury cycling and methylation in aquatic ecosystems
- IV.Mercury bioaccumulation
- V. Toxicological effects and risk management

GLOBAL MERCURY: SUMMARY

- Mercury in all of its forms is a serious environmental issue nationally and globally
- Mercury moves locally, regionally, and globally
- Mercury in its methylated form enters the food chain and becomes human health problem
- NSTC Interagency Working Group on Methylmercury is focusing on R&D within Federal agencies to find a path towards solutions
- Gulf of Mexico will be examined as priority study
- UNEP Global Mercury Assessment examining global environmental and human health issues related to mercury use and emissions.